The MONTHLY REVIEW

Published by the

American Electro-Platers Society

A SOCIETY FOR THE ADVANCEMENT
OF THE
SCIENCE OF ELECTRO-PLATING

v.9 #4

APRIL, 1922

Entered as second-class matter, August 11, 1921, at the Post Office at Grand Rapids, Mich., under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized August 12, 1918

KRESGE-HOOKER SCIENCE LIBRARY WAYNE UNIVERSITY

DEC 10 1947

Copyright, by American Electro-Platers Society

This book is the property of the members of the American Electro-Platers' Society. Papers printed herein are released after 10 days, except when rights are reserved.

EXECUTIVE BOARD, A. E. S., 1921-1922

President
Philip Uhl, 2432 N. 29th St., Philadelphia, Pa.

First Vice-President
S. E. Hedden, 227—5th St., Aspinwall, Pa.

Second Vice-President
F. J. Hanlon, 2921 George St., Chicago, Ill.

Secretary-Treasurer
J. E. Sterling, 468 Grand Ave., Long Island City, N. Y.

Past President
Sylvester P. Gartland, 128 Bryan St., Rochester, N. Y.

Editor
Walter J. Allen, 451 Norwood Ave., SE., Grand Rapids, Mich.

Associate Editors
Prof. Keith Kennedy, 1334 Logan St., S.E., Grand Rapids, Mich.
Dr. W. Blum, Bureau of Standards, Washington, D. C.

INDEX

Editorial 3
Nickel-Plating 4
Industrial Chemistry 9
Answers to Many Questions 11
What the Branches Are Doing 15
New Members, Etc 21
Branch Directory 24

The essential things of life which distinguish one individual from another, which give one man a higher place among his fellows and another a lower, are just two: First of all, perseverance—the ability to keep everlastingly at it; and, secondly, imagination or vision—the ability to see beyond the present moment, and to understand that the work at hand reaches beyond the present moment, and so is worth while.—Gifford Pinchot.

MONTHLY REVIEW

Published by the

American Electro-Platers' Society

Editors' Office, 236 Wellington Ave.. S. E., Grand Rapids, Mich.

VOL. IX APRIL No. 4

EDITORIAL

OFFICERS

Among the rank and file of our membership there seems to be a feeling that to be an officer of one of the Branches, or even of the Supreme Society, is a matter of very little importance. As May is Branch election month with nearly all our Branches, it would be wise if we all took a few moments of our busy lives to think seriously about the matter.

Now, really, do YOU think it of small importance who YOU elect in YOUR Branch?

The success of any business depends almost entirely upon its executives, great and small. The success of all organizations of our kind, depends entirely upon their elected officers. Get a bunch of men that "Leave it to George," and your Branch will soon DRY-ROT.

On the contrary, elect officers that WILL work and DO work, and you are assured of a prosperous and growing Branch.

Our organization depends more on good leadership than most others. IT IS FOUNDED ON THE PRINCIPLE OF UNSELFISHNESS, and the man that will unselfishly do the work of an officer, is the one to elect: that will reflect itself in the progressiveness of the Branch.

Conscientious officers have more work to do than the member ever imagines, and much more than he can appreciate; if you disagree with this statement—make yourself a candidate and find out.

In Branch elections do not fail to elect strong delegates to Cincinnati. We speak of that often, but it is of unusual importance: also do not fail, as a Branch, to pay at least the railroad expenses of your delegates. It is a poor representative that is not worth that small expenditure of Branch funds.

The lay membership has even less appreciation of what the duties of the Supreme Officers are. The Editor would like to call attention to one little item of a Supreme Officer's duties: namely, his correspondence. It is a matter of fact that the Editor has received an average of one letter per week from each Supreme Officer. Not much? Count the officers and you will find that the exchange on that basis will require approximately one letter per day. And none of them have private stenographers!

NOTE.—We wish to correct the statement made in the Bridgeport report, published in the February "REVIEW", that H. J. Blanchard of Niagara Falls, N. Y., was reported dead. Mr. Blanchard is not dead. We had a letter from him a short time ago denying the statement, and we are inclined to believe him. However, we regret to announce the death of his father; and Mr. Blanchard has the sympathy of the whole Society.

EDITOR.

RESEARCH PROBLEM NO. 14. TO COMPARE FLUO-BORATE NICKEL SOLUTION WITH THE SOLUTION USED AT N. C. R. CO.

Read by Mr. Suman of Dayton Branch

PROBLEM—To compare the Fluo-Borate Nickel Solution with the Solution used at the N. C. R. Co., on the following points:

(1) Rate of Deposition;
(2) Quality of Plate;
(3) Structure of Plate;
(4) Wearing Quality of Plate;
(5) Effect of Temperature on Rate of Deposition and Quality of Plate.

Composition of Nickel Fluo-Borate Solution:

Nickel Sulphate (24° Baumé).....3 lbs. per gal.
Boric Acid.....2 oz. per gal.
Hydrofluoric Acid.....1¼ oz. per gal.
Neutralized with Nickel Carbonate

Composition of the Double Nickel Sulphate Solution:

Nickel Ammonium Sulphate.....12 oz. per gal.
Nickel Sulphate ..... 4 oz. per gal.
Boric Acid ..... 2 oz. per gal.

The work on this problem was done in the Plating Department of the N. C. R. Co. A regular plating-tank was used, and the plating was done on a production part. For these reasons the data accumulated can be applied to production work.

The claim was made that by the use of the Fluo-Borate Solution, worked at a temperature of 100° F. or higher, the rate of deposition could be increased to four times that of standard practice with the old solution.

Four series of runs were made:

First—Raising the temperature and keeping the voltage constant.

Second—Raising the voltage and keeping the temperature constant.

Third—Raising both the voltage and the temperature.

Fourth—Running a light load with the voltage constant and varying the temperature.

Samples of the solution were taken at regular intervals for chemical analysis. Samples of the work plated in each

run were also taken before and after buffing. These samples, with data, were mounted on a board for comparison. The quality and structure of the plating, and the buffing properties were noted.

An attempt was made to make micro-photographs of the plate, but so far has not been successful.

Series I.—Voltage 2.4 volts.

Temperature ranging from 70° to 140° F. in steps of 10°.

It was found that the current density per square foot cathode area of the Fluo-Borate solution was greater at any given temperature and voltage than that of the N. C. R. solution, due to the lower resistance of the Fluo-Borate solution. This lower resistance is due to the higher concentration of nickel ions in the solution. Also, the current density of both solutions increase with an increase in temperature, due to the decreased resistance in the electrolyte.

The plate has a tendency to develop more smut the higher the temperature is raised. This is true of both solutions, however, the Fluo-Borate solution will stand a higher temperature with an acceptable deposit, than the N. C. R. solution. The temperature has a marked effect on the buffing properties of the deposit. Both solutions buff somewhat harder as the temperature of the plating-bath is raised.

It was possible, by raising the temperature of the bath to 140° F, to plate the required amount of nickel, 21 pennyweights per 200, or 10.25 square feet, in the Fluo-Borate solution in 26 minutes, in the N. C. R. solution in 31 minutes.

After this series was run, it was decided that the Fluo-Borate solution was too acid on account of the hardness and brittleness of the deposit. The solution was made practically neutral by the further addition of nickel carbonate.

Series II.

In this series of runs the temperature was kept constant (room temperature 72° F), and the voltage was increased in steps of .5 volts from 2.5 to 4 volts, (this was the highest voltage that could be obtained at this tank).

Raising the voltage increased the current density and the rate of deposition.

The plate remained soft and smooth up to 3.5 volts; then the plate burned in the N. C. R. solution, and cracked and peeled on the bottom end in the Fluo-Borate solution. This condition in both solutions must be caused by the high voltage. However, both buffed easily and gave a good bright plate up to 4 volts.

The increased rate of deposition, due to the increased voltage in the Fluo-Borate solution, gave the required amount of plate (21 pennyweights) in 25.8 minutes at 4 volts. The N. C. R. solution gave the required plate in 29.4 minutes at 4 volts.

An extra run (No. 23) was run in the Fluo-Borate solution to see if cracking and peeling at the bottom ends could not be overcome by lowering the work in the tank so as to more nearly equalize the anode surface in respect to the cathode surface. This helped to a great extent, as there were only three or four pieces that cracked and peeled, and they were hung about one inch lower than the remainder. We were able to obtain 4.9 volts for this run, and it gave the required amount of plate (21 pennyweights) in 19 minutes.

The further neutralization of the Fluo-Borate solution before this series was run, entirely removed the difficulty of a brittle and rough, smutty deposit.

Series III.

In this series of runs, the temperature of the bath and the voltage were raised. As the temperature was increased the plates became more smutty as in Series I, and were harder to buff.

The Fluo-Borate solution will give an acceptable plate at a higher temperature and voltage than the N. C. R. solution. Also the N. C. R. solution gave considerable trouble with pitting at the higher voltages and temperatures. This is caused by hydrogen being given off at the cathode, as the N. C. R. solution is worked at a slight acid reaction, while the Fluo-Borate solution is worked practically neutral. It was also found that by raising the temperature of the bath at higher voltages, the work did not burn or crack and peel as it did when the voltage alone was raised. In the Fluo-Borate solution we found that at 130° F, 3.55 volts was the highest voltage that would give an acceptable plate. The required amount was obtained in 16.7 minutes. The temperature was lowered to 120° F, and run at 4 volts, and an acceptable plate was obtained in 14.5 minutes.

Run No. 34 of the N. C. R. solution at 110° F, 3.5 volts, did not give an acceptable plate due to buffing hard, and about 10% burning at the bottom.

Run No. 35 was then run at 100°, 3 volts, and was taken as the maximum voltage and temperature at which this solution could be worked satisfactorily. The required amount was deposited in 34 minutes on Run No. 35, and in 25 minutes on Run No. 34.

In the Fluo-Borate solution a higher voltage and lower temperature combination may give a faster rate of deposition without spoiling the work. No experiments could be made on this, as 4 volts was the maximum voltage that could be obtained at this tank.

Series IV.

This was run to accurately determine the efficiency of the respective solutions.

This was made necessary by the discovered inaccuracy of the methods used in determining the efficiency up to this time; namely, weighing 20 pieces out of 200, plating and re-weighing. It was decided that these 20 pieces were not always representative, due to "shading", etc.

Three runs were made in each solution at 2.5 volts, and at different temperatures, using 50 pieces and weighing them all.

The efficiency increased slightly with rise in temperature in the N. C. R. solution, but remained almost constant in the Fluo-Borate solution.

Average efficiency of the Fluo-Borate.....97.0%
Average efficiency of the N. C. R.....95.7%

All weights given in Charts I, II, III, and IV, were figured from these efficiency values.

In using this light load, the required amount of plate per square foot was plated out in about one-fourth the time that a full load at a like temperature and voltage could be plated, a current density being obtained for times as great. The plate obtained was not burnt or cracked and peeled. This is shown by comparing the current density in Charts I and III, and II and IV. This shows that it is not the current density per square foot, but the voltage that causes the burning, or cracking, and peeling.

CONCLUSION

(1) Rate of Deposition

Raising the temperature of the bath increases the rate of deposition.

Raising the voltage increases the rate of deposition.

By a combination of high temperatures and high voltages, the rate of deposition is increased to a much greater extent.

The Fluo-Borate solution can be worked at a slightly higher combination of voltage and temperature than the N. C. R. solution, as shown by Chart III.

2. Effects of Rise in Temperature of Bath on the Deposit.

The rise in temperature of the bath causes a smutty or cloudy plate. This is slightly more marked in the N. C. R. solution than in a neutral Fluo-Borate solution.

The decrease in resistance of the solution is proportional to the increase in temperature up to about 110° F., above this temperature the decrease in resistance is not as great per degree rise in temperature, and falls off rapidly above 120° F.

The smut or cloudiness obtained on the plate is objectionable at temperatures above 120° F., therefore, neither solution should be worked above 120° F.

3. Effects of High Voltages.

Raising the voltages up to and above 3.5 volts on the N. C. R. solution causes "burning,' a rough, dark deposit on the bottom end of the work. The same voltage, on the Fluo-Borate solution, causes cracking and peeling on the bottom ends. This condition can be overcome to a great extent by lowering the work in the tank.

Therefore, neither solution should be worked above three volts, at room temperature.

4. Effects on Deposit of Running Light Load in Tank.

The rate of deposit per square foot is increased as the load is decreased, as shown by comparing Charts I, II, or III, with Chart IV. The current density shown on Chart IV is about four times that of a like run shown on any of the other Charts, and the quality of the plate is about the same.

5. Chemical Analysis.

The chemical analysis of the solution showed no change in composition from run to run. The amount of work was so small compared to the volume of the solutions, that the difference in composition could not be determined.

6. Cost of Solutions.

N. C. R. Solution: 25c per gallon; $45.00 per tank.
Fluo-Borate Solution: 45c per gallon; $81.00 per tank.

Suggestions for Further Work on Nickel-Plating.

(1) The use of a higher voltage and a lower temperature on the Fluo-Borate solution.

(2) Working the N. C. R. solution in a more neutral condition.

(3) Experiments with the Fluo-Borate solution on different classes of work.

(4) Mechanical testing for comparative determination of wearing properties of the deposits.

(5) Experiments with the N. C. R. solution, by building up the nickel content with nickel sulphate. Also by the addition of hydrofluoric acid.

On may 4, 1921, Messrs. Fraine, Suman, Carter, Cook, Bates, Maeder, and Beaver held a meeting in the Research Library to consider this report, and the following recommendations were made:

(1) Measure resistance of the two solutions.
(2) Try Magnesium Carbonate as substitute for Nickel Carbonate.
(3) Take micro-photographs showing structure of deposit of each solution.
(4) Try addition of Hydrofluoric Acid to standard N. C. R. solution.
(5) Determine cause of pitting of Fluo-Borate solution when operated at normal temperature.

A. B. BEAVER,
Research Department.

NOTE—This is only a preliminary test, as more work is to be done.

INDUSTRIAL CHEMISTRY

By Dr. Arnold of Brown University

(Read before the Providence-Attleboro Branch)

Mr. Toastmaster, Members of the American Electro-Platers' Society and Guests:—

I am very much honored by your kind invitation to meet with you tonight, and to be one representative of the American Chemical Society. I am going to take a few minutes to bring to your attention the importance of chemistry to our nation at the present time, and in so doing it will not be amiss to discuss briefly the rôle of chemistry in our everyday life.

Chemistry is the fundamental science of the transformation of matter, and the fundamental laws of chemistry apply equally well to the most widely divergent national industries. The science of chemistry is simply an indexing of these laws

and an orderly arrangement of the facts upon which they are based. We all know what tremendous strides the chemical industries have taken since 1914, and the question that is now before the public is whether we wish to retain those industries, together with a chemical independence, or whether we wish to allow ourselves once more to be dominated by competing nations. Let us see what contributions chemists have made that influence everything we do.

First in the rôle of agriculture, which is the chief source of our prosperity. Agriculture would be impossible without chemical fertilizer, and these same fertilizers would not exist if it were not for the practical application of chemical theories. The great potash deposits of the world were rendered available by such means. Our country has 150 plants engaged in obtaining acid phosphate from phosphate rock. Nitrogen is essential to all plant growth, and chemists are working at the utmost speed to obtain a method of giving us a cheap way of utilizing the nitrogen of the air for fertilizers. The farmer is all the time competing with the various insects such as the potato bug, the brown tail moth, the boll weevil, etc., by means of insecticides which are of chemical origin. We should also remember that in our continual fight against disease, we are dependent upon remedies given to us by the chemist.

Our transportation problem is one of the largest before the world today. But we depend for our steel rails upon the Bessemer process of making steel which is essentially based upon chemical theory. Today we are making demands that are not satisfied by Bessemer steel, and we have before us nickel steel for armor, tungsten steel for cutting tools, etc. The statement has been made that without vanadium steel the Ford car would be impossible. All sorts of alloys that are useful, have been given to the world, and all sorts of possibilities for future alloys are before us. The rôle of chemistry is easily seen in the automobile, for here we have the artificial leather, the rubber tire, the paints and pigments, the aluminum, and even the obtaining of the fuel is a problem based upon the fundamental laws of chemistry.

A former professor of mine used to state that the progress in civilization of any country could be estimated providing one could ascertain how much sulphuric acid the country used. But our chief supply of sulphur is based upon methods given to us by Frasch in Louisiana when he conceived the idea of melting the sulphur as it lay by superheated water and then to pump the molten sulphur to the surface.

Few individuals realize how many chemical processes are at work in Niagara Falls to produce by means of electric furnaces and cells such products as aluminum, metallic sodium, graphite, carborundum, chlorin, caustic soda, peroxide, carbides, etc., all of which at the present time are essential to modern life.

It is stated that in 1911 the total annual production of aluminum was 40,000,000 pounds, and the market price $0.22. How could we get along without it? And yet in 1890 the price of aluminum was $4.00 per pound.

The rôle of explosives in modern industrial life is well known, but we should realize that all of our mining, the building of railroads, the building of canals, etc., is dependent upon enormous stores of chemical energy which may be made instantly available.

This sort of information could be carried on continuously but time forbids. In closing, however, I want to leave with this audience, the members of which are at all times using chemical products and the industries of which are dependent upon chemical skill and knowledge, the thought that chemistry is facing one of its most serious periods. Industries which were developed during the war are unsettled. Nobody knows what is going to happen, and many wonder what our policy should be. Pasteur has expressed it well in the statement, "Science is the soul of the prosperity of nations, and the source of all progress." And progress in science is dependent upon research. We must realize that in supporting colleges and technical schools which foster research, that we are building well for the future. Chemistry as a science improves products, abolishes waste, establishes new industries and aids the old. I sincerely hope that every person here present will do whatever he may be able to aid the cause of chemistry, and thereby to build for the future prosperity of his own industry and that of the country at large.

ANSWERS TO MANY QUESTIONS

By THEODORE C. EICHSTAEDT

Question No. 4, Chicago Branch, in the January "Review."

Question No. 4: Regarding blisters on acid copper deposit on steel work (?)

The writer has noted with very much interest the way Chicago Branch has been advancing the idea of acid copper deposit upon steel, and also noted that many have been experimenting along that line, and

some have tried to do it with very poor results. Personally the writer does not see any advantage in it, and any plater of experience knows it is not **practical,** but that it is one of this freaks of plating that has come into much publicity and I will say **notoriety,** and turned many good plater's head. But in answer to the question the writer will state: Don't try to get away with acid copper deposit upon steel or cast-iron work. Acid copper solutions are o. k. in their place, and especially for electrotyping, but for depositing upon metal cyanide copper solutions will deposit more copper in any given time than acid copper solutions, therefore why take chances by trying to use an acid copper deposit upon such metals. The writer has displaced acid copper in many places with cyanide copper solutions to good advantage, and saved much worry, time, labor and space for the concerns employing him at the time. My advice is to keep away from such freak ideas as acid copper deposits on steel and cast-iron when by using a hot copper cyanide solution one can clean and deposit at the same time.

Comment on Question No. 2 in the November "Review" of Milwaukee Branch regarding the cause of spots on Nickel-plated Steel, etc.

The answer gives a formula of a nickel solution as follows: Water, 1 gallon; single and double nickel salts, 8 oz. each; boracic acid and salt, 2 oz. each.

The writer wishes to state that it is his opinion that if all due care had been taken by the operator in cleaning the work before it is placed in the nickel solution, and all due care had been taken in the rinsing of his work after plating (by this I mean carefuly rinsed in cold water and then in hot water, and if possible another clean, cold running water and then in clean, hot water), if the work is of such a nature that it need not be run thru sawdust, it would not have any stains on it if it was thoroly dried by either swinging in the air or an air-hose or fan were employed in the drying process. Again, if the work was of such a nature that it would not dry without the sawdust, it is very likely that the sawdust was either not heated or it was contaminated with foreign substances, such as gums, etc. If sawdust is at all used in drying work, it should be boxwood or hard maple, and it should be clean and heated.

The writer cannot see how nickel solutions made up to the foregoing formula would give a spotted deposit in itself.

He has also found in his many years of experience with nickel solutions that salt is a very good thing or chemical to keep out of nickel solutions at all times, but found that magnesium sulphate, commonly called Epsom Salts, is much better than common salt, and that twice as much boracic acid and Epsom Salts could be added to this formula and the salt omitted, which would produce a much whiter deposit in a little less time also.

Question No. 1, Milwaukee Branch, in the January "Review."

Question No. 1: Can a nitric acid dip be replaced by any other dip or pickle in the process of zinc-plating cold rolled steel castings?

The writer will state that it all depends upon the shape and size of

the work to be zinc-plated. He also knows that unless proper equipment for a nitric acid dip is installed it should not be used, as the fumes are very detrimental to the operator and the plant in which they are being used.

If there is or can be a sand blast installed, the nitric dip can be dispensed with, but a hydrofluoric dilute dip or pickle must be used after sand blasting, as a film of silicate is left on the work from the sand, but if steel grit is used for blasting, the hydrofluoric acid pickle or dip need not be used, but a hydrochloric or muriatic dip can be used instead. Always, if possible, dispense with the nitric acid dip.

Question No. 3, Milwaukee Branch, in the January "Review."

Regarding inexpensive "Platinum Gray" Finish. The answer given mentions **"Sand Blasting after plating."**

The writer wishes to correct this idea of sand blasting after plating. He also wishes to state that if the articles are small and made of brass, they can be wired for plating, run thru potash or other cleaner in bunches. They should all be polished and buffed, but need not be colored; after which they can be matt dipped. This is cheaper than the "sand blast." Then they should be rinsed carefully and plated a short time in a nickel solution and taken out and rinsed and dipped in a water lacquer. This is the cheapest and least expensive way of handling the work. But should the work consist of steel stampings of small dimensions, so that they can be wired, use a steel or soft iron wire. Clean in bunches in the ordinary way. Dip in hydrofluoric acid diluted, or hang them in there for a minute or two to remove rust, and then dip into nitric acid as pure as possible; then rinse and dip in Muriatic acid, clear acid, and rinse them into nickel solution for a few minutes to cover or as long as desires; rinse and then water dip lacquer.

Should the work be of cast brass or die castings or cast-iron or larger work than the above mentioned, then the work should be polished, buffed and cleaned and then sand blasted. Do not sand blast before plating. Then the fingers must be kept off of the surface when handling as they will show thru plate if tarnished, etc. They can, however, be bright dipped, but this will affect the blast finish. They are plated (not heavy) just long enough to cover and give a good appearance and rinsed and if possible water lacquered. This eliminates all chance of staining in drying. Automobile body hardware on closed bodies is finished in this way on most all closed body work.

Comment on Question No. 5, Chicago Branch, in the January "Review."

Question No. 5—What is the best abrasive for Polishing, artificial or mineral?

The answer as given: "It was thought that for roughing the artificial abrasive was the sharpest, but broke down quicker than Turkish emery. For fine work on steel and good high color, Turkish emery was thought the best.

It was stated that in polishing brass, this was hard to discern until the work was ready to buff, and then scratches loomed up."

The writer's experience as a Polisher and Plater along these lines has been wide and varied. He has traveled "some", as they say, and has had to face many "polishing" propositions long before he took up "Road Work," meaning by this actually taking charge of Polishing Departments in different parts of the country, after having worked himself as Polisher and Buffer steady for 12 years. Therefore, he is in a position to KNOW, and not simply THINK, as the question is answered in the REVIEW, that it is "thought."

My answer to the question is: Artificial Abrasives of the right kind and make are by far superior for all kinds of metal polishing. The question answered in the way it is by Chicago Branch in the January REVIEW is not positive, showing to the writer that there seems to be no decisive or positive argument given during the discussion. The principle of efficiency in an abrasive is its productiveness, or we will say, its cutting and lasting qualities, and in my travels I find that where an actual test is conducted, the artificial abrasive always wins out or proves more efficient, but I can readily see why "it is thought" otherwise. First, there are many electro-platers who are not polishers by actual experience, and such having charge of plating and polishing departments, generally have a man under them in charge of the polishing department, and whose word is taken for such things as efficiency of abrasives, glue, etc., and he in turn takes the word of the man at the wheel, or in other words the polisher, for it.

Now as I have been a polisher and KNOW how he looks at it, I will state that unless he is known to be a reliable, honest, conscientious, proven man, his opinion or word does not amount to much, and that is one reason why so many concerns are still away behind the times and under production in their polishing department. The metal polishers are as a whole the most conservative set, because every new device, wheel, machine or abrasive, etc., looks to them like something that will increase this production, and consequently they will fight any change from the regular material they have been using until such time that they are promoted to a foremanship, and when their eyes open to what is required of them they try to improve conditions and efficiency, etc. All you men who have ever worked at the wheel know this to be the truth. And all of you men who now work at the wheel also know it is the truth, and the quicker you get out of the idea that the foreman is putting one over on you because he is making it easier for you to get out a day's work by improving conditions, etc., the sooner you will be able to become one of those foremen.

Artificial abrasives are sharper, cust faster, and if of the kind adapted for the work, they will not break down as quickly. Regarding finishing, I will state it is only a question of adopting the proper size of artificial abrasive for your particular kind of work. In tests and trials the writer has been able to eliminate some operations altogether by using artificial abrasives in place of mineral.

WHAT THE BRANCHES ARE DOING

GRAND RAPIDS BANQUET

Grand Rapids Branch held its Fourth Annual Banquet at the Elks' Club dining-room, April 15th, with several members from out of town, and not a few very welcome visitors.

"Oh Boy!" the eats were great. That broiled chicken and all made the dinner a success, and under the spell of plenty of good food, the spirit of good-fellowship seemed to prevail among all present. After coffee and cigars, the entertainment and educational program began by singing several popular songs under the leadership of W. A. Jones of the Y. M. C. A., accompanied by Prof. Carl Lillidale.

President Charles Whalley delivered the address of welcome. He was at his best and the flow of language would have done credit to a certain man who has "also ran" many times for President of the United States.

Mr. W. J. Allen was introduced as Toastmaster, and in a few words introduced Prof. George Frazee, principal of the Vocational High School of Grand Rapids, who took as his subject, "Looking Up." Prof. Frazee is a very magnetic speaker, and attracted close attention to every one of the many good points in his speech.

E. Lamoreaux, of Chicago, was next, and spoke on "The Objects and Aims of our Society." "Ernie" presented his subject very clearly and forcibly. A very favorable impression of our Society was created in the minds of those present.

Secretary W. A. Blodgett of the Metal Trades Association was next introduced, and spoke of his organization. His best points were that the objects of his Association were very similar to those of the A. E. S. Mr. Blodgett will be welcome at any of the meetings of the Grand Rapids Branch.

Bert Hogan, Grand Rapids' "Irish-Dutchman" then gave us a long string of very good stories about "Heinie." Hogan is inimitable and a favorite with any gathering of men.

A few more songs, led by "Jones," and then some papers of which the one by R. J. Hazucha, "Cleaning Metals," was discussed with considerable interest. Mr. Shakespeare, of Kalamazoo, Prof. Baker, of Ann Arbor, and John Knape, of Grand Rapids, and many others took part in the questions. "Rudie" said, as he took his seat that "it reminded him of the questions asked a married man when he returned home too late at night."

Librarian Poe read a paper bearing on the "Growth of the Society," which was very good, and the evening closed by singing "America," led by Mr. Jones.

The singing was all spirited and the success of the meeting was proven by the number of our members and guests that grouped together after adjournment and discussed the many points that were brought out in the discussions.

The Committee in charge deserve all credit it is possible to give them. As appointed the Committee was as follows: J. Van Dyke, chairman, J. Raven, and Mr. Schultz. President Whalley and Secretary Warner gave all help in their power, both meeting and working with the Committee. To that co-operation and the personal work of the Chairman, we can ascribe the success of the best banquet ever given by the Grand Rapids Branch.

PUBLICITY COMMITTEE.

CHICAGO QUESTION-BOX FOR MARCH

(Continuation)

QUESTION NO. 6—Can an aluminum rod be nickel-plated to withstand slight bending; also what method of procedure should be used in plating and can a heavy deposit of nickel be used.

ANSWER NO. 6—It was thought that drawn rod would crack, and method of deposit was to use chloride of iron dip and then immerse in nickel solution direct.

QUESTION NO. 7—I am plating some 16 inch brass fans, reinforced with galvanized iron soldered in. There are 12 holes bored thru them and I am having trouble with blistering around these holes. The solution boils a great deal. What causes this and does it hurt the solution?

ANSWER NO. 7—It was thought that soldering acid and flux used in soldering under pressure of current was forced out, causing gas and blistering at the holes. It was also suggested to strike reinforcement in copper before soldering same onto the brass and then plate in a solution containing ½ oz. of citrate of soda and 2 ozs. chloride of nickel to the gallon.

QUESTION NO. 8—In electro-galvanizing steel, then direct into copper or brass bath, without rinsing, then rinse and place in nickel, which will be better method to use, brass or copper between the zinc and nickel? Will the brass be absorbed by the zinc, as in case of copper? Which will be the best to use, sulphate of zinc or carbonate; would sulphate of aluminum be of any advantage for this purpose as a whitener?

ANSWER NO. 8—Cyanide of zinc thought best, going from brass in copper; brass best, as you get a brighter deposit. Absolutely, the copper would be absorbed out of the brass at about the rate of 2/10 grain of copper to the square foot, and the last part of the paragraph must be answered with No!

QUESTION NO. 9—How and for what purpose is silicate of soda used in the polishing-room and plating-room? Would like a formula for an oxide of zinc solution.

ANSWER NO. 9—Silicate of soda is used in place of glue in polishing-rooms, and in the plating-room. Some cleaners contain it. Oxide of zinc solution formula was referred to the Bureau of Standards' Paper No. 195, dealing with this subject.

QUESTION NO. 10—Why is it that a plating-tank springs a leak more readily when it stands idle than when in use?

ANSWER NO. 10—It was thought that when the room was closed up and shut in, that lack of moisture on the outside of the tanks caused them to check and crack the lining, and by loosing the bolts caused by the shrinking. It was suggested that it was a good idea to keep a window open in the room, allowing a certain amount of circulation to keep the moisture in the room, thus preventing tanks from drying out externally.

PLATING DYNAMOS

FLOYD T. TAYLOR, Electrical Engineer

(Part of the Report of the Conn. Valley Meeting of Feb. 14.)

Mr. Floyd T. Taylor then gave a talk on electro-plating dynamos, illustrating his remarks with sketches on a blackboard. Starting with Ohm's law, the general meaning of the relation between the voltage, the current and the risistance in a circuit was explained. It was also carefully pointed out that contrary to the customary opinion, direct current dynamos do not produce current, but produce only voltage, or electrical pressure. It was pointed out particularly that the current which will flow when a circuit is established, flows by virtue of the condition set up in the plating-tank, and not by virtue of anything done to the generator. In other words, the generator runs, and continues to run in exactly the same way whether there is work in the tanks or not, and the amount of current which flows, due to the quantity of work in the tanks, or other manipulations formed at the tanks by the plater himself.

The three types of generators used in plating-rooms were then explained: the shunt, the compound wound, and the interpole. The general principles of each type were carefully outlined, including the advantages and disadvantages of each type, starting with the shunt machine, giving the reason for and the function of the series field coils of the compound wound generators were explained in detail, and the difference in the kind of functions performed by the interpole winding as compared with a compound winding on an ordinary generator, were also carefully explained.

The general difference between voltmeters and ammeters was next covered in a brief way, as was also the phenomenal of the fall of potential in a circuit. Two types of tank rheostats were illustrated and explained, namely, the series coil type and the parallel coil type, together with a statement of their principal advantages and disadvantages, pointing out clearly, however, that the fundamental principle of both types of tank rheostats was exactly the same.

In conclusion Mr. Taylor made a strong plea for a study of the fundamentals by foremen platers, and a thoro knowledge of the fundamentals prior to any attempt to understand the theories which explain the various actions and reactions in a plating-room. He also pointed out that in commercial practice it was difficult, if not impossible, to do research work and that the attempt to do research work might give re-

sults which were misleading and consequently harmful. The keeping, however, of accurate records of the composition and maintenance of solutions was strongly urged by all foremen platers.

ST. LOUIS

Our meeting, held on April 1st, was well attended. In the absence of President McGinley, Vice-President F. Horath was in the chair. One applicant was elected to membership, and our "Booster Committee" started to line up our members for the Cincinnati Convention.

A paper on "Pitting—Causes and Remedies," written by E. W. Heil, was read. This paper was very good and a vote of thanks sent to Mr. Heil. We also had a paper on the same subject read by John T. McCarthy. "Mac" is one of the old-time platers, but keeps up with the young fellows in progressive ideas. His paper was appreciated.

On May 6th the subject for discussion will be "Cleaning Up Metals for Plating," with papers by F. N. Weber, F. Horath, and F. C. Rushton.

The election of officers for the next term will take place; also the election of delegates to Cincinnati.

REPORT OF THE NEW YORK BANQUET

Having been selected as the victim to report the "Big Time" of the New York Branch, that occurred on February 18th, 1922, and by this time having thoroughly recovered from the effects of said "Big Time," I hereby take the plunge.

Well, Founders Day is over, and the **Thirteenth** Annual Banquet of the New York Branch has come and gone. In accordance with the modern acceptation of the ancient superstition, it proved to be the luckiest yet. Following the usual custom of this Branch in having each affair it tackles eclipse its predecessors, there certainly was a hall full of joy and animation. This can readily be conceived when you consider a crowd of over 260 persons all out looking for a good time. Did they find it? I'll say they did. If you don't believe me, ask them.

As to the entertainment, did you hear "Fisher's Jazz Band"? Oh, boy, did they jazz, Well, some! Our old Secretary is right on the job when it comes to getting music. Score one for Fisher. And how that bunch that Sterling found did sing! They certainly did keep things howling, and did they get the diners singing? I guess they did, and then some. You've got to hand it to Sterling when it comes to picking entertainers. He knows where they grow.

And say, didn't the Ladies' Auxiliary Committee do themselves proud? What with the tea and cake they served in the afternoon, along with the various games they indulged in, not forgetting that Cootie Game (imported from Indianapolis) at least that's what they say, but it looked like a good chance for the ladies to roll the "galloping dominoes." The ladies who attended sure did enjoy themselves; if they did not, it was their own fault. The Ladies' Committee deserve great credit for what they did. You should have seen Mesdames Sterling, Haddow and Flanigan on the jump all afternoon, greeting the lady visitors as soon as they entered the door, getting them introduced, etc. It was a

great system: Hello, welcome, who are you; wait a minute, I'll register for you. Come along and meet New York's feminine contingent. Meanwhile Mesdames Stremel, Fisher, Popper, Havens, and Voss were busy entertaining the ladies at the games and distributing the various souvenirs, favors, etc. There weren't any awkward minutes or pauses in the conversation, neither were there any wall-flowers. The New York ladies certainly are some hostesses. Mesdames Proctor and Uhl came in later in the afternoon and had the soft pedal on, but we are surely looking forward to meeting them again next year. As to the ladies' costumes, being a mere man, I could not attempt to describe them, but they surely were colorful, in fact, to me they looked as if times were pretty good with the platers.

It certainly was some picture to see that dining-room after the bunch were all seated, and the photographer was quite nervous, fearing for the success of his "flash." He said it was a regular Coney Island Mardi Gras, with all the balloons, blimps, areoplanes, rackets, streamers, confetti, etc. And say, how they did trim those eats. Boy, it was some spread. That chicken and Virginia ham sure were good, and believe me I ate my share, alright. You stay-at-homes sure did miss a good time, especially the ladies. You ladies will be jealous alright when you meet the ladies who were there, wearing those necklaces that were distributed to the ladies with the compliments of the New York Branch. This Branch surely appreciates its lady guests and lets them know it. But never mind, I bet you will make hubby take you along next year. After that you will insist on going even if you have a game leg, as you know there is always a pleasant surprise awaiting the ladies.

And the crowd that attended the session almost made you think a Supreme Convention was in session. Poor Grinham had a case of writers' cramp trying to register them all as fast as they came in, and Secretary Haas collected so much money at the door, that he was unable to walk around with it. He had to call on Chairman Haddow to help him dispose of it, and believe me, he did. If you doubt my word, you should have made a visit to the Committee-room. I wonder why so many wished to see the chairman? And funny as it may seem, they all found their way to the Committee-room every time, and you should have seen the expression on their faces, angelic and otherwise, when they appeared on the scene again. A huge success, the Committee-room, was the verdict of all who know.

As to the Founders session, it sure was a success. It gave you the impression that you were in the heart of a Supreme Convention. With Mr. Proctor in the chair and Supreme President Uhl, Hogaboom, Madsen, Stewart, Flanigan, the Maraffis, Dunn, Stratton, Dinan, Sturdevant, Homan, Scott, Reama, Barnard, Johnquest, Mesle, Haddow, Wilson, Stremel, Voss, Popper, Morningstar, Backus, Trumbour, Smith of Newark, Smith of Philadelphia, Sizelove, Seivering, Frey, Gehling, Wernlund, and a host of others too numerous to mention, including our well known Supreme Secretary, who are pretty well known at Supreme Conventions. When this host got going, it certainly did sound familiar, and believe me, mister, this is only a taste of what you will get when

you visit New York to attend the Supreme Convention in 1924, at least we hope so. So I would advise you to keep your dates for the middle of that summer open for a while, and then come prepared for the best time you ever had, the greatest convention in the history of the A. E. S.

There was quite a display of articles in various finishes, especially quite a few from Mr. Morningstar, who had samples of various patinas in greens, browns, etc., which were very good indeed. Also the baseball trophy, presented at the Indianapolis Convention to the winners of the baseball game, was on exhibition. It has been all fixed up and will be sent to the Cincinnati Convention to be again battled for. The winners of three out of five games to keep it permanently.

Mr. Proctor opened the session by addressing the meeting on the "Spirit of Co-operation," after which Dr. C. J. Wernlund of the New York Branch presented a paper on "Experiments on the Electrodeposition of a Heavy Copper Deposit from the Cyanide Solution," which furnished a very lengthy discussion. Mr. Hogaboom presented a paper on "Amperes per Square Foot vs. Faraday's Law." This was discussed quite thoroughly, and say, how Madsen did take a slam at the commercial measuring instruments. Other papers were presented by Mr. Burke and Mr. Morningstar of the New York Branch, but the writer did not get in on these, as he was called outside to attend to some duties for the Committee, which was composed of the following: T. B. Haddow, T. Stretch, H. Flanigan, J. E. Sterling, A. Grinham, W. Fisher, A. Havens, John Burke, B. Popper.

The ladies who assisted the Committee were: Mrs. J. A. Stremel, Mrs. J. E. Sterling, Mrs. T. B. Haddow, Mrs. B. Popper, Miss I. Havens, Mrs. W. Fisher, Mrs. H. Flanigan, Mrs. W. Voss, Mrs. T. Stretch, Mrs. J. Burke.

All of the papers presented will, I understand, be published in the "REVIEW" as soon as President Stremel can get them in shape.

The writer noticed that Supreme President Uhl and Secretary Sterling were having quite a lengthy consultation, grave matters of state, I presume. I just wonder where the Chairman was keeping himself previous to his appearance at the Club?

During the dinner numbers were distributed, and a drawing was held. There were three prizes. A great big doll, that made all of the ladies wish for the lucky number, and two boxes of candy. Supreme President Uhl drew the numbers, and Philadelphia lady won the doll. Was it a coincidence or was it instructions by wireless? We reserve all rights to our own opinion, nevertheless, maybe the lady needed that doll more than we did, since she was a bride.

To the best of my recollection this is all that happened at the "Big Time." Most of it I was able to remember, but have been helped out on details by my wife, who has already made all arrangements to attend next year. If nothing else will bring the ladies, at least their curiosity to discover what each coming year's surprise will be, will get them there.

Until next February I am, Reminiscently yours,

THE SCRIBE.

NEW MEMBERS

St. Louis

J. W. Fisher.....210 S. 9th St., Metropolis, Ill.

Cleveland

H. S. Kneeland.....3924 Clybourne Ave., Cleveland, Ohio
C. J. Carrick.....2036 W. 26th St., Cleveland, Ohio

New York

W. A. Leppert.....107 E. 89th St., New York City, N. Y.

APPLICATIONS FOR MEMBERSHIP

Chicago

Andrew Hay.....1920 Howe St., Chicago, Ill.
Isadore Earl Cooper.....LaSalle, Ill.
Erwin Sohn.....1001 W. Van Buren St., Chicago, Ill.
J. McNamara.....3108 W. Jackson Blvd., Chicago, Ill.
Charles Smalley.....1030 N. State St., Chicago, Ill.
H. L. Perkins.....152 Carl St., Chicago, Ill.

Cleveland

Jesse W. Groomes.....1014 Second St., Lorain, Ohio

Indianapolis

Raymond J. Kitchen.....204 Tinkler St., Lafayette, Ind.

New York

Arthur Bowker.....294 Western Bank, Sheffield, England
James Puritan.....General Delivery, New Brunswick, N. J.

Philadelphia

L. Reis.....629 Vine St., Philadelphia, Pa.

OBITUARY

MR. ELLSWORTH E. FITCH, Jr.

After an illness, lasting less than a week, Mr. Ellsworth E. Fitch, Jr., aged 36 years, of 607 Sawyer St., Rochester, N. Y., passed away at his home on April 19th, 1922.

Mr. Fitch succeeded his father several years ago as Superintendent of the Polishing and Plating Departments at the plant of the General Railway Signal Company, Rochester, N. Y. He held this position up to the time of his death.

He was a member of Genesee Camp, No. 8450, Modern Woodmen of America, also an active member of the Rochester Branch, American Electro-Platers' Society, which body he conscientiously and faithfully served for the past year as Secretary and Treasurer.

Mr. Fitch had worked painstakingly and faithfully for several weeks past in connection with arrangements for the Annual Banquet of the Rochester Branch, which was to have been held at the Hotel Seneca, Rochester, N. Y., on Saturday, April 22. The Banquet has since been postponed because of Mr. Fitch's death.

Besides leaving a host of friends, who will greatly miss him, and to whom he had endeared himself, he is survived by his wife, Hazel C., one son, Ellsworth E., of Rochester; his parents, Mr. and Mrs. Ellsworth E. Fitch, Sr., and one brother, Raymond F. Fitch, all of Buffalo, N. Y.

The funeral was held from his late residence, on Saturday afternoon, April 22, at 2 o'clock. Burial was at Riverside Cemetery, Rochester, N. Y.

DAYTON

On March 4th our Branch celebrated its ninth anniversary with a Dinner. This proved to be a success in every way, having the largest attendance of any of our previous meetings, there being 65 present.

Our President, Mr. Robert Suman, introduced Mr. Walter Fraine, who delivered an address of welcome to our guests and members present. Mr. Fraine told them what benefits were derived by employer and plater by association in our Society.

Mr. M. G. Kopf recited some poetry, touching the platers, on our troubles of today as against yesterday. Mr. Kopf introduced Mr. R. E. Maeder of the Research and Test Department of the National Cash Register Co. Mr. Maeder gave us an excellent talk on barrel copper-plating for heat-treating requirements. This was a very interesting subject to both heat-treater and plater, as proven by the discussions between them.

Mr. F. Nordman, President of Cincinnati Branch, told us of the arrangements being made for our coming Convention. From all appearances this should be the best in our history.

Our Membership Committee reported with three applications, and two re-instatements. We expect to hear more from them in the near future.

CHICAGO

The regular monthly meeting of the Chicago Branch was held on April 8. We had with us Frank Rushton, of St. Louis Branch, who enlivened the evening by a fine description of Mexico and his impressions of the same.

There were seven applications received, and a committee appointed to investigate the same.

Past Supreme President O. E. Servis read a paper on "Silicate of Soda," by James G. Vail, written for "Abrasive Industry," which was well received and brought a fine discussion on cements and wheel binders.

The Chairman of the Convention Committee reports progress and promise.

PHILADELPHIA

The regular monthly meeting was held on April 7th, with a good attendance, President George Gehling presiding.

One application was received and one elected to membership.

Candidates for 1922-'23 Branch officers were nominated.

The topics for discussion were on a paper read by Mr. Bell on Rust-proofing; delining of Milk and Ice Cream cans, removing of stearic acid from cast iron.

A large delegation will attend the Newark banquet.

BRIDGEPORT

The following is a report of the meeting of Bridgeport Branch held on March 17. We had 25 members present, and listened to a very interesting talk by Mr. Brown, of Worcester, Mass.

We also had with us several platers who are not as yet members, and they also gave very interesting talks on their various experiences as platers.

We have had several very fine sample boards sent us by our friends and members, showing the various finishes done by them, and we are now able to discuss and show almost every finish done by the plating industry.

We are still going strong on our regular Friday night round table talks, and the members are continually bringing up new ideas and discussions.

We have a sprayer and lacquers and enamels on hand, and the boys are making good use of them.

Would you look across the plains of Time and see where earth and heavens meet? Broaden your horizon by standing on higher ground. Stand upon the high ground of great thots; stand sometimes upon the mountain tops of faith where all the forests, rivers, lakes, and plains of experience meet and mingle in pictures of moral beauty; stand there, and God shall speak to you, an you shall know the mystery of the transfiguration.—Perin.

CINCINNATI IN NINETEEN TWENTY-TWO

CINCINNATI HAS

Twenty Miles River Frontage
Many Beautiful Parks
Fine Drives, and
Many Other Features

CINCINNATI IS

DOING NOTHING
BUT
Make Convention Preparation

CINCINNATI IN NINETEEN TWENTY-TWO

BRANCH DIRECTORY

BOSTON

Regular meetings are held second and fourth Thursdays of each month, at 8 p. m., at the American House, Boston. Secretary, A. W. Garrett, 37 Dorset St., Dorchester, Mass.

BRIDGEPORT

Meets third Friday of each month in its laboratory, 260 John St., Bridgeport, Conn. Secretary, L. J. Maraffi, 744 Hancock Ave., Bridgeport, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., at the Hardware Club of Chicago, Room 1125. Secretary, F. J. Hanlon, 2921 George St., Chicago, Ill.

CINCINNATI

Meets on the first and third Friday of each month, at 1262 State Ave. Secretary, W. J. Husing, 729 McMakin Ave., Cincinnati, Ohio.

CLEVELAND

Meets last Saturday of each month at Hotel Winton. Secretary, B. F. McCormick, 2024 Wyandotte Ave., Lakewood, O.

CONNECTICUT VALLEY

Meets on the second Tuesday of each month at 202 Washington St., Hartford, Conn. Secretary, G. E. Vibberts, 31 Crown St., Hartford, Conn.

DAYTON

Meets first Saturday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, C. Van Derau, 61 Bish Ave. Dayton, Ohio.

DETROIT

Meets first Friday of each month at the Board of Commerce, Lafayette and Sheldon, at 8 p. m. Secretary, O. H. Phelps, 951 Clay Ave., Detroit, Mich.

GRAND RAPIDS

Meets on the second Wednesday of each month at the Vocational High School, 129 Bostwick Ave., NE. Secretary, J. Andrew Warner, 738 Fairview Ave., N. E., Grand Rapids, Mich.

INDIANAPOLIS

Meets the second Saturday of each month at Hotel Denison. Secretary, Louis Mertz, 1728 Union St., Indianapolis, Ind.

MILWAUKEE

Meets second and fourth Thursdays of each month at the West Side Bank Bldg. Secretary, R. Steuernagel, 1508 Concordia Ave., Milwaukee, Wis.

MONTREAL

Secretary. A. Geroux, 48 Craig West, Montreal, Quebec, Canada.

NEWARK

Meets first, third and fifth Fridays of each month at Forresters' Home, 20 Central Ave., Newark, N. J., at 8 p m Secretary, O. F. Carlson, 225 West Grand St., Rahway, N. J

NEW YORK

Meets second and fourth Fridays of each month at the Broadway Central Hotel Parlors, New York City. Secretary, E. Haas, 75 Warner Ave., Elmhurst, L. I.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, P. Uhl, 2432 North 29th St., Philadelphia, Pa.

PITTSBURGH

Meets first Saturday of each month at 8 p. m., at United States Bureau of Mines Bldg., Forbes St. Secretary, S. E. Hedden, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third Thursday of each month at 26 Custom House St., Room 16. Secretary, C. J. Poyton, 269 Ohio Ave., Providence, R. I.

READING

Meets on the second Tuesday of each month. Secretary, William M. Fisher, 654 Gordon St., Reading, Pa.

ROCHESTER

Meets every second and fourth Friday of each month, at Hotel Seneca. Secretary, E. E. Fitch, Jr., 607 Sawyer St., Rochester, N. Y.

SYRACUSE

Secretary, M. J. Crean, 109 Court St., Syracuse N. Y.

ST. LOUIS

Meets first Saturday of each month at Barr Branch Library, corner Jefferson and Lafayette Sts. Secretary, H. H. Williams, 4156 Botanical Ave., St. Louis, Mo.

TOLEDO

Meets first Thursday of each month at Toledo University Science Building, Electro-Platers' Room, corner Cherry and Page Sts. Secretary, H. L. Myers, 410 Palmer, Toledo, Ohio.

TORONTO

Meets second Thursday of each month at Occident Hall, Bathurst and Queen Sts. Secretary, C. Kemish, 271 Boston Ave., Toronto, Ontario, Canada.

WATERBURY

Meets every second and fourth Friday of each month. Secretary, Wm. Delage, 47 Prospect St., Waterbury, Conn.